

EXECUTIVE SUMMARY

This purpose of this report is to document the data, methods and assumptions used by staff of the South Florida Water Management District (SFWMD) to develop minimum flow technical criteria for the Northwest Fork of the Loxahatchee River. The Loxahatchee River and Estuary watershed is located on the southeastern coast of Florida in Martin and Palm Beach counties. It includes the Northwest, Southwest and North Forks of the Loxahatchee River, a major drainage canal (C-18), the surrounding watershed, and the estuary. This system is of particular importance because the Northwest Fork was designated as Florida's first Wild and Scenic River, in 1985. It is located at the southern end of the Indian River Lagoon (part of the National Estuary Program), and includes a State Park and an Aquatic Preserve.

Florida law requires the water management districts to develop a priority list and schedule for the establishment of minimum flows and levels (MFL) for surface waters and aquifers within their jurisdiction (Section 373.0421 F.S.). This list, included in the *District Water Management Plan* for the South Florida Water Management District (SFWMD 2000a), identified the need to develop an MFL for the Loxahatchee River by 2002.

Section 373.042(1) F.S. defines the *minimum flow* as the “. . . imit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. . . .” For purposes of establishing the minimum flow, SFWMD Rule 40E-8.021 defines *significant harm* as the “...temporary loss of water resource functions which result from a change in surface or ground water hydrology, that takes more than two years to recover, but which is considered less severe than serious harm...”. Water resource functions protected under Chapter 373 are broad and include flood control, water quality protection, water supply and storage, fish and wildlife protection, navigation, and recreation. Water management districts must also consider any changes and structural alterations that have occurred, and develop a recovery and prevention strategy for water bodies that do not, or are not expected to, meet the proposed criteria during the planning horizon.

The focus of this report is on the development of MFL criteria for the Northwest Fork of the Loxahatchee River to protect the remaining floodplain swamp community and downstream estuarine resources against significant harm. Due to the lack of recent flow or biological data from the North Fork, the inability to regulate flow from the North Fork and the highly altered nature of the Southwest Fork, these two arms of the Loxahatchee Estuary were not considered for MFL establishment at this time.

Prior to development, nearly level, poorly drained lands, which were subject to frequent flooding, characterized most of the region. The current managed system includes a primary and several secondary drainage systems and associated water control facilities that have been constructed to make this region suitable for agricultural and residential development. Structural changes that were considered during criteria development included: excavation and stabilization of the Jupiter Inlet; dredging, filling, and bulk heading within the estuary and Northwest Fork; construction of major canals (C-18) and water control structures (S-46); secondary drainage systems; and the effects of

consumptive uses within the basin.

Effects of such changes on regional hydrology, river flow, estuary hydrodynamics and river vegetation communities are documented. Over a century of water control and structural modifications to this system have led to changes to the quality, quantity, timing, and distribution of flows delivered to the river and estuary, resulting in hydrologic and ecological changes to the system. Salinity impacts observed within the river occurred in association with construction and dredging of Jupiter inlet in 1947 and subsequent upstream navigational improvements over time. Drainage and land development activities have changed the timing and distribution of flows from the watershed to the river, producing large discharges during wet periods and extended periods of little or no discharge during extreme dry periods. The estimated magnitudes and impacts of these changes are described in the report.

Pursuant to the requirements contained in Chapter 373 of the Florida Water Resources Act, water resource functions are identified and technical relationships of these functions to water flows and levels are described based on best available information. This information includes: results of a literature review and incorporation of results obtained from previous investigations; analysis of current and historical flow and salinity data; interpretation of aerial photography/GIS studies of the river over time; results from river vegetation surveys; results of a preliminary river soil salinity survey; development and application of a hydrodynamic/salinity model to estimate long-term salinity trends at selected sites; development of empirical flow/salinity relationships; a floodplain hydrology analysis; and modeling to determine the overall effect of consumptive uses on the ability to provide flows to the Northwest Fork.

Proposed minimum flow criteria for the Northwest Fork are linked to the concept of protecting valued ecosystem components (VEC) from significant harm. The VEC identified for the Northwest Fork is the river's freshwater floodplain swamp. An assemblage of six freshwater tree species and associated vegetation community parameters were identified that characterize the VEC. The designation of the Wild and Scenic River identified the floodplain swamp and its associated cypress forest as a resource of outstanding value that needs to be protected. Since cypress trees themselves appear to tolerate a wide range of salinity conditions and are slow to show a response to salinity stress, researchers at the SFWMD identified the above six freshwater swamp species that, as a group, appear to be a more sensitive indicator of adverse salinity conditions. Protection of these species will assure that the floodplain swamp and their associated communities of freshwater species are also protected from significant harm.

Proposed MFL criteria for the Northwest Fork of the Loxahatchee River were based on determination of the following:

- Biological surveys were conducted along the Northwest Fork to characterize vegetation changes that occur in relationship to the existing salinity gradient.
- Results showed highly correlated relationships between salinity conditions at a site and measured vegetation community parameters (canopy structure, number of species, abundance, tree height and trunk diameter, presence of saplings or seedlings). Based on these results, proposed definitions of stress, harm, and significant harm were developed for the Northwest Fork.

- Results of this study indicate that sufficient quantities of fresh water from the Lainhart Dam are required to protect the floodplain swamp and associated bald cypress habitat against significant harm. This freshwater forest community was identified as a valued ecosystem component (VEC) for the Wild and Scenic portion of the Northwest Fork of the Loxahatchee River.
- Research conducted by the SFWMD identified locations on the river where both “healthy” and “stressed” floodplain communities exist (at river miles 10.2 and 9.7, respectively), and identified downstream locations where significant harm to this community is presently occurring (river mile 9.2).
- In order to protect the remaining healthy and stressed floodplain swamp community and the area that currently is experiencing significant harm, sufficient flow should be provided from the Lainhart Dam whenever possible to maintain essentially freshwater conditions in the river upstream of river mile 9.2.
- Modeling results indicate that flows below 35 cubic feet per second from Lainhart Dam cause salinities in excess of 2 ppt to occur at sites where remaining stressed and harmed plant communities exist along the Northwest Fork of the Loxahatchee River. Frequent exposure to salinity levels in excess of 2 ppt were associated with damage to freshwater vegetation.
- During periods of regional drought, due to the limited storage capacity of the basin, it may not be possible to maintain fresh water conditions at river mile 9.2 or to meet the 35-cfs flow criterion at all times. In order to prevent damage or stress from occurring to the floodplain swamp community at river mile 10.2 and significant harm from occurring at river mile 9.2, freshwater flows should not decline below a discharge rate of 35 cfs at the Lainhart Dam for a period of more than 20 consecutive days, more often than once every six years.

Based on the above information, SFWMD staff propose the following MFL criteria for the Northwest Fork of the Loxahatchee River:

An MFL violation occurs within the Northwest Fork of the Loxahatchee River when an exceedance of the minimum flow criteria occurs more than once every six years. An “exceedance” is defined as when Lainhart Dam flows to the Northwest Fork of the river decline below 35 cfs for more than 20 consecutive days within any given calendar year.*

Currently, during dry periods, flows to the Northwest Fork of the Loxahatchee River do not meet the proposed MFL criteria. Therefore, when the MFL Rule is adopted, a Recovery Plan will be implemented to achieve the MFL as required under Section 373.042(1) F.S. The proposed Recovery Plan includes structural, operational and regulatory components that when implemented will provide sufficient additional water to the Northwest Fork to meet the proposed MFL by 2006.

* A flow of 35 cfs is equivalent to a recorded stage of 10.68 ft. NGVD as measured upstream of the Lainhart Dam at the SFWMD maintained gauge named “LNHART_W”.

The Recovery Plan includes the following key projects to be completed by 2006:

- Construction of the Loxahatchee Slough structure (G-160) to capture and store water in the Slough to maintain a more natural hydroperiod for the Slough and provide water deliveries to the Northwest Fork during the dry season
- Construction of a flow-way under Northlake Boulevard (G-161) to provide additional water from the regional system through the Grassy Waters Preserve to the C-18 Canal and provide supplemental flows to the river during the dry season.
- Widening the M-canal and increasing the capacity of the Control 2 pump station to provide increased water conveyance capacity for the system.
- Under the Recovery Plan the SFWMD will continue to provide 50 cfs of flow to the Northwest Fork whenever water is available.

The Recovery Plan also includes a regulatory component. The goal is to regulate the amount of water withdrawn from the river, its tributaries (C-18, Cypress Creek, Hobe Grove Ditch and Kitching Creek), and the surficial aquifer adjacent to the river consistent with District rules governing consumptive uses that may influence a MFL water body in recovery (Rule 40E-8 F.A.C.). The regulatory component will apply to consumptive use applications for renewals, new uses, and modifications to existing permits that influence the MFL water body. Future Environmental Resource Permit rulemaking will be initiated to establish supplemental criteria to be applied to permit applications for projects located within the Loxahatchee River Watershed. The rulemaking initiative will consider the inflow needs of the river from both a water quality and water quantity perspective. Additional hydrologic watershed analyses will be needed to establish the appropriate technical criteria.

While implementation of the Recovery Plan to meet the MFL is ongoing, the SFWMD is also committed to restore the Loxahatchee River and Estuary in addition to protecting the Northwest Fork from significant harm through the proposed MFL. The SFWMD and the Florida Department of Environmental Protection are partners with other agencies and local governments to establish a practical restoration goal, and associated restoration plan, for the Loxahatchee River watershed. The SFWMD is also committed to implement, along with its other river restoration partners, projects for restoration contained in the LEC Plan, the NPBCCWMP, and CERP. Several projects are being considered in the CERP, North Palm Beach County Project, Part 1, which will create increased storage and water conveyance within the basin to provide more water for the Loxahatchee River and Estuary.

The SFWMD will adopt water reservations for the Loxahatchee River to protect water made available for the recovery and restoration of the river. It is the intent of the SFWMD to adopt an initial water reservation for the Northwest Fork of the river by 2004 to protect existing flows delivered to the river for protection of the floodplain swamp and its associated fish and wildlife. Over the next twenty years, subsequent reservations will be adopted for the river as new projects are designed consistent with the Recovery Plan. Additionally, reservations will be adopted for the Loxahatchee River consistent with other water bodies and will address the needs of the natural system across a broad range

of hydrological conditions. Water reservations will prevent water reserved for the environment from being allocated to consumptive uses. The reservations will be implemented over time through permit criteria, operational protocols and water shortage rules.

The Recovery Plan also includes an adaptive assessment approach to research and monitoring of the watershed, which is designed to (a) fill gaps in our knowledge of the hydrodynamics and ecology of the Loxahatchee River and Estuary, and (b) improve the District's understanding of what are the additional water needs of the river and estuary. The proposed MFL criteria will be refined as new information is assimilated into the MFL development process and new restoration goals are defined for the river and estuary.

And finally, the SFWMD plans to add the following tributaries: Cypress Creek, Hobe Grove Ditch, and Kitching Creek, which provide significant flows to the Northwest Fork of the Loxahatchee River, to the District's 2003 MFL priority water body list. MFL criteria and implementation rules for each of these three tributaries will be developed in conjunction with preparation of restoration goals, objectives and performance measures associated with the northern Palm Beach County CERP project.